ARCLG090
Geographical Information Systems in Archaeology and History

2017–2018

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Turnitin Class ID: 3545476
Turnitin Password IoA1718
1 Overview

1.1 Short description

This course explores both the theoretical issues and practical methods associated with using Geographical Information Systems (GIS) for archaeological and historical research. This handbook contains information about the content and administration of the course. Queries about its objectives, structure, content, assessment or organisation should be directed to the Course Co-ordinator. Additional resources pertaining to this course in particular can be found on the course’s Moodle pages (http://moodle.ucl.ac.uk/course/view.php?id=3477). Further general information can be found at http://www.ucl.ac.uk/archaeology/handbook/common/ and in the general MA/MSC handbook. It is your responsibility to read and act upon this information, which relates to originality, submission and grading of coursework; disabilities; communication; attendance; and feedback.

1.2 Week-by-week summary

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1.3 Basic texts


Bevan, A.H. & Lake, M. (Eds.) 2013. Computational Approaches to Archaeological Spaces. Walnut Creek, US: Left Coast Press. [INST ARCH AK 30 BEV]
1.4 Methods of assessment

This course is assessed on the basis of two pieces of coursework: (i) a project, consisting of three individual practical assessments, the sum of which contribute 50% to your final grade; (ii) a written essay, no more than 3000 words in length, also worth 50% of your final mark. The topics and deadlines for each assessment are specified below. If you are unclear about the nature of an assignment, they should contact me. I will be willing to discuss an outline of your approach to the assessment, provided this is planned suitably in advance of the submission date.

1.5 Teaching methods

The course is taught by a mixture of lectures, practical sessions and group discussion. Students will be expected to have done the necessary tutorial revision in order to continue to follow the practical session in class and to contribute actively to discussion.

1.6 Workload

There will be 20 hours of dedicated lectures and practicals for this course, and students are expected to undertake around 70 hours of tutorial revision and further reading for the course, plus 60 hours preparing for and producing the assessed work. This adds up to a total workload of approximately 150 hours.

1.7 Prerequisites

There are no formal prerequisites for this course.

2 Aims, objectives and assessment

2.1 Aims

The course aims to provide an:

- an introduction to the principles of archaeological and historical GIS and
- an introduction to the fundamentals of GIS
- an insight into the ways GIS is applied in archaeology and history
- a practical awareness of the the techniques use to acquire, manage and visualise spatial data
- a familiarity with a range of computer software, particularly ArcGIS
- a grounding for those wishing to take the more advanced GIS Approaches to Past Landscapes (ARCLG091) course

2.2 Objectives

On successful completion of this course a student :

- understand the theoretical implications that GIS and spatial analysis bring to archaeology as analytical and interpretative aids,
• be familiar with ArcGIS and ArcInfoWorkstation
• be able to navigate spatial data and build a GIS Project
• construct effective spatial and attribute queries
• be familiar with data generalisation and statistical pattern recognition
• be able to digitise vector datasets and conduct raster interpolations (e.g. DEMs)
• be familiar with viewsheds and distance functions
• construct effective map layouts

2.3 Learning outcomes
In meeting these objectives you will also be able to demonstrate the following generic learning outcomes:

• an understanding of the core principles of GIS;
• the ways in which spatial data can be acquired and properly structured within a GIS system;
• the appropriate ways of visualising spatial data, and
• an awareness and some practical experience of the range of analytical possibilities GIS offers for interpreting archaeological spatial data.

2.4 Coursework
2.4.1 Assessment tasks
This course is assessed entirely via a notebook of practical work and an essay. The notebook involves three separate practical tasks whose deadlines will be roughly at fortnightly intervals throughout the term:

• Project construction. Using the downloaded topographic and archaeological survey files, edit them for use in GIS using ArcMap. Then create an appropriately structured ArcMap document using the edited data.

• Basic analysis. Establish what patterning there is, if any in the distribution of archaeological sites in the study region.

• Presentation. Produce a series of appropriately edited maps displaying the archaeological and topographic features of the study area.

The essay due on Monday, January 8th, 2018. It should strictly be between 2,850 and 3,150 in length. If students are unclear about the nature of an assignment, they should discuss this with the Course Co-ordinator. Students are not permitted to re-write and re-submit essays in order to try to improve their marks. However, students may be permitted, in advance of the deadline, to submit for comment a brief outline of the assignment. The Course Co-ordinator is willing to discuss an outline of the student’s approach to the assignment, provided this is planned suitably in advance of the submission date. The suggested essay topics are:
What types of data structure are necessary for a large cultural resource management project such as a sites and monuments (or heritage environment) record. Please consider both desktop and online provisions, as well as issues of data interoperability.

Discuss ONE aspect of GIS-led analysis that you think will have the most impact on archaeology in the next decade. Explain why its potential has NOT yet been realised fully and make sure to discuss what efforts are necessary to develop it more effectively in the future.

‘GIS is only useful to archaeology as a means of managing spatial data and identifying spatial patterns; it cannot be used to explain past processes or behaviours’. Explain why you agree or disagree with this statement.

2.4.2 Word Counts

The following should not be included in the word-count: title page, contents pages, lists of figure and tables, abstract, preface, acknowledgements, bibliography, lists of references, captions and contents of tables and figures, appendices.

Penalties will only be imposed if you exceed the upper figure in the word count range. There is no penalty for using fewer words than the lower figure in the range: the lower figure is simply for your guidance to indicate the sort of length that is expected.

In the 2017-18 session penalties for overlength work will be as follows:

- For work that exceeds the specified maximum length by less than 10% the mark will be reduced by five percentage marks, but the penalised mark will not be reduced below the pass mark, assuming the work merited a Pass.

- For work that exceeds the specified maximum length by 10% or more the mark will be reduced by ten percentage marks, but the penalised mark will not be reduced below the pass mark, assuming the work merited a Pass.

2.4.3 Coursework submission procedures

- All coursework must normally be submitted both as hard copy and electronically. (The only exceptions are bulky portfolios and lab books which are normally submitted as hard copy only.)

- You should staple the appropriate colour-coded IoA coversheet (available in the IoA library and outside room 411a) to the front of each piece of work and submit it to the red box at the Reception Desk (or room 411a in the case of Year 1 undergraduate work)

- All coursework should be uploaded to Turnitin by midnight on the day of the deadline. This will date-stamp your work. It is essential to upload all parts of your work as this is sometimes the version that will be marked.

- Instructions are given below.

Note that Turnitin uses the term class for what we normally call a course.

1. Ensure that your essay or other item of coursework has been saved as a Word doc., docx. or PDF document, and that you have the Class ID for the course (available from the course handbook) and enrolment password (this is IoA1718 for all courses this session -
note that this is capital letter I, lower case letter o, upper case A, followed by the current academic year)

2. Click on http://www.turnitinuk.com/en_gb/login

3. Click on Create account

4. Select your category as Student

5. Create an account using your UCL email address. Note that you will be asked to specify a new password for your account - do not use your UCL password or the enrolment password, but invent one of your own (Turnitin will permanently associate this with your account, so you will not have to change it every 6 months, unlike your UCL password). In addition, you will be asked for a Class ID and a Class enrolment password (see point 1 above).

6. Once you have created an account you can just log in at http://www.turnitinuk.com/en_gb/login and enrol for your other classes without going through the new user process again. Simply click on Enrol in a class. Make sure you have all the relevant class IDs at hand.

7. Click on the course to which you wish to submit your work.

8. Click on the correct assignment (e.g. Essay 1).

9. Double-check that you are in the correct course and assignment and then click Submit

10. Attach document as a Single file upload

11. Enter your name (the examiner will not be able to see this)

12. Fill in the Submission title field with the right details: It is essential that the first word in the title is your examination candidate number (e.g. YGBR8 In what sense can culture be said to evolve?),

13. Click Upload. When the upload is finished, you will be able to see a text-only version of your submission.

14. Click on Submit

If you have problems, please email the IoA Turnitin Advisers on ioa-turnitin@ucl.ac.uk, explaining the nature of the problem and the exact course and assignment involved.

One of the Turnitin Advisers will normally respond within 24 hours, Monday-Friday during term. Please be sure to email the Turnitin Advisers if technical problems prevent you from uploading work in time to meet a submission deadline - even if you do not obtain an immediate response from one of the Advisers they will be able to notify the relevant Course Coordinator that you had attempted to submit the work before the deadline.

3 Schedule and syllabus

3.1 Teaching schedule

The course will be taught in Term 1 and classes will be held from 9-12pm on Wednesday in cluster room 501 of the Institute of Archaeology.
3.2 Practical Groups
Students following this course attend as a single group for the course lectures from 9-10am and then typically split into two groups for practical sessions that run over the following two hours. Further details about the arrangements for practical sessions will be provided at the first session.

3.3 Detailed week-by-week syllabus
The syllabus below provides a short summary of the main themes covered in each weekly session as well as a range of preliminary readings. The course places an emphasis on applied skills and hence, in addition to the general and weekly readings, students are also expected to work through four course tutorials designed to reinforce the skills learnt in class.

Session 1: A Rough Guide to GIS
This first week offers an introduction to GIS, including its history as a technique and discipline, its achievements so far and its current role in archaeology.

Practical  Introduction to ArcGIS, navigation, basic data manipulation.

Essential reading


Session 2: Data Structures and Geodesy
We consider more of the basic principles underlying the use of GIS, concentrating on the types of data model currently used to describe spatial phenomena. We then explore the importance of geodesy and geographic coordinate systems.

Practical  Moving between coordinate systems. Introduction to the Kythera dataset and to vector data models. Building ArcGIS projects. Principles for manipulating symbology.

Essential reading

Session 3: Vector Data: Acquisition and Manipulation

We focus more closely on one type of data model (vector), exploring its main advantages, disadvantages, how it is acquired and the contexts in which it is most commonly used.

Practical  Heads-up and tablet digitising, attribute editing, data cleaning, metadata

Essential reading


Bell, T. and Bevan, A. 2004 *A Survey of GIS Standards for the English Archaeological Record Community*, Report Commissioned by English Heritage. URL: [http://discovery.ucl.ac.uk/149398/](http://discovery.ucl.ac.uk/149398/) (For now, read mainly for the long tradition of preferring vector datasets in UK archaeological records)


Session 4: Operations for Vector Data

We explore how to go about asking interesting questions of information recorded in a GIS, particularly using vector data. In particular, we consider the great possibilities created by the combination of spatial and aspatial queries. Data generalisation is a related topic addressing the formal means by which we summarise, present and make sense of complex datasets.

Practical  Importing spreadsheet data, one-to-one attribute joins, spatial joins, many-to-one relations, attribute and spatial queries.

Essential reading


Session 5: Raster Data: Acquisition and Manipulation

We focus more closely on raster data models, addressing how they are acquired and their contrasting strengths and weaknesses when compared to vector data.
Practical  DEMs and derivative surfaces.

Essential reading


Session 6: Operations for Raster Data

Raster data can be a particularly powerful way of approaching spatial questions because of its support for a range of arithmetic, boolean, relational and zonal operators. We consider how such procedures have been used within GIS applications both in general and with particular regard to archaeological research.

Practical  Map algebra, neighbourhood statistics, filtering, histograms

Essential reading


Session 7: Analysing Patterns in Spatial Data

The formal analysis of spatial patterns is one of the great strengths of GIS, but one often ignored in the rush for more flashy GIS functionality. Here we consider the types of statistical treatment often used on zonal and point data, as well as the special treatment required for spatial data, which is often not provided by classical statistical models.

Practical  Point pattern analysis, data export to spreadsheet packages, chi-square tests and statistical charts.
Essential reading


Bevan, A. 2002 'The Rural Landscape of Neopalatial Kythera: a GIS perspective', *Journal of Mediterranean Archaeology* 15.2: 217-256. (already a bit dated, but an introduction to the part of the Greek island of Kythera that is considered in the third practical assessment and to some examples of landscape-scale pattern analysis) [IoA Pers, or from me directly]

Orton, C. 2000 Sampling in Archaeology, Cambridge: Cambridge University Press. (Read early chapters for a view of spatial sampling and its importance). [INST ARCH AK 10 ORT]

Session 8: Advanced Vector and Raster Functions

This week tackles more advanced aspects of route- and region-based modelling, offering an introduction to topics such as hydrological models, viewshed analysis and cost surfaces that are treated in greater detail in the companion course GIS2 (ARCLG091).

Practical An introduction to viewshed analysis, cost surfaces and least cost paths.

Essential reading


Session 9: Maps and Digital Cartography

This week we consider the role of cartography in recent human history, the principles behind modern maps, and the implications of new technologies such as internet-based map servers and collaborative mapping.

Practical The process of producing map layouts for printing or still digital capture, according to proper cartographic principles. Also the incorporation of 3D views.

Essential reading

Dent, B.D. 2009 *Cartography: Thematic Map Design*, London: McGraw-Hill. [INST ARCH ISSUE DESK; GEOGRAPHY QUARTOS D 40 DEN] (Worth browsing several of the chapters for the main issues)


### Session 10: Review and Prospect

The final week is an opportunity to review the topics covered by the course and also offers a chance to discuss in more detail some concrete strategies for addressing particular archaeological questions using GIS. We also discuss the future of GIS within the discipline of archaeology. There are no required readings, but students are encouraged to ask the coordinator for further reading on specific topics either ahead of or during the session.

**Practical** Review of practical skills based on a series of typical GIS workflows in archaeology.

### 4 Online resources

The full UCL Institute of Archaeology coursework guidelines are given here: [http://www.ucl.ac.uk/archaeology/handbook/common/](http://www.ucl.ac.uk/archaeology/handbook/common/). The full text of this handbook is available here (includes clickable links to Moodle and online reading lists if applicable) [http://www.ucl.ac.uk/silva/archaeology/course-info/](http://www.ucl.ac.uk/silva/archaeology/course-info/) and on the course website: [http://moodle.ucl.ac.uk/course/view.php?id=3477](http://moodle.ucl.ac.uk/course/view.php?id=3477).

### 5 Additional information

#### 5.1 Libraries and other resources

In addition to the Library of the Institute of Archaeology (5th floor), other libraries in UCL with holdings of particular relevance to this course are the Science Library (D.M.S. Watson building on the central UCL site) and the Environmental Studies Library in Wates House on Gordon Street. You may also wish to consult the list of electronic journals available through UCL ([http://metalib-a.lib.ucl.ac.uk:8331/V?func=find-ej-1](http://metalib-a.lib.ucl.ac.uk:8331/V?func=find-ej-1)). A full list of UCL libraries and their opening hours is provided at [http://www.ucl.ac.uk/library/](http://www.ucl.ac.uk/library/).

The University of London Senate House Library ([http://www ull.ac.uk/](http://www ull.ac.uk/)) also has holdings which may be relevant to this course.

#### 5.2 Attendance

A register will be taken at each class. If you are unable to attend a class, please notify the lecturer by email. Departments are required to report each student’s attendance to UCL Registry at frequent intervals throughout each term. Students are expected to attend at least 70% of classes.

#### 5.3 Information for intercollegiate and interdepartmental students

Students enrolled in Departments outside the Institute of Archaeology should collect hard copy of the Institute’s coursework guidelines from the Academic Administrator’s office (Room 411A).
5.4 Dyslexia

If you have dyslexia or any other disability, please make your lecturers aware of this. Please discuss with your lecturers whether there is any way in which they can help you. Students with dyslexia are reminded to indicate this on each piece of coursework.

5.5 Feedback

In trying to make this course as effective as possible, we welcome feedback from students during the course of the year. All students are asked to give their views on the course in an anonymous questionnaire which will be circulated at one of the last sessions of the course. These questionnaires are taken seriously and help the Course Co-ordinator to develop the course. The summarised responses are considered by the Institute’s Staff-Student Consultative Committee, Teaching Committee, and by the Faculty Teaching Committee.

If you are concerned about any aspect of this course we hope you will feel able to talk to the Course Co-ordinator, but if you feel this is not appropriate, you should consult your Personal Tutor, the Academic Administrator (Judy Medrington), or the Chair of Teaching Committee (Dr. Karen Wright).

5.6 Health and safety

Students enrolled on this course are particularly reminded of the measures that should be taken to reduce possible discomfort arising from the extended use of computer workstations. See the advice provided on the web at http://www.ucl.ac.uk/efd/safety_services_www/guidance/dse/index.htm.